Atmos. Chem. Phys. Discuss., 8, S2808–S2810, 2008
www.atmos-chem-phys-discuss.net/8/S2808/2008/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Assimilation of stratospheric and mesospheric temperatures from MLS and SABER into a global NWP model" *by* K. W. Hoppel et al.

G. Manney (Referee)

manney@mls.jpl.nasa.gov

Received and published: 18 May 2008

This paper presents a nice analysis of initial results from assimilating MLS and SABER temperatures into a high-altitude NWP model. The results are interesting and timely, and generally well-presented, and should be published in ACP with mostly minor revisions/clarifications as described below.

The one somewhat substantial question that I see to be left unanswered is that of how these analyses assimilating MLS and SABER data directly compare with the results using a similar model/assimation system configuration, but without including the MLS and SABER data. While the authors spend considerable time showing (convincingly)

that the analyses do a good job of simulating the SSW, they do not explicitly address the question of whether/where this is a significant improvement upon the results obtained without assimilating MLS and SABER data. While I understand that exactly similar runs without MLS and SABER may not be available, surely there must be some runs with similar configurations that could be examined to address this question?

Specific comments follow, in order of appearance in the text, not importance:

1. Abstract, Lines 10-12, MLS shows this as well as SABER – in fact, better in some ways, since the SABER time series is incomplete because of the yaw cycle.

2. Page 8458, Line 4, GEOS-4 (extending higher than the ECMWF configuation used for reanalysis) has also been used for long-term reanalysis.

3. Page 8464, Line 21, Why is the lower limit set at 32 hPa? SABER has good quality temperatures down to 100hPa, and MLS down to 316hPa.

4. Page 8464, Line 28, "colder" should be "lower".

5. Page 8465, Lines 14-15 and page 8466, Lines 16-20, Are the results of Ren et al. (2008, GRL, 35, L06804, doi:10.1029/2007GL032699) on vertical propagation of information in data assimilation systems relevant here?

6. Page 8466, Line 2, "cold" should be "low".

7. Page 8466, Lines 24-28, Is there a substantial latitude dependence to the MLS/SABER biases? And why is SABER, rather than MLS modified (though both temperature measurements have been validated, I would have thought SABER to be more "mature" and better qualified, e.g., from published reports, it does not appear to have some known artifacts that trouble MLS (e.g., vertical oscillations, a "glitch" just above 1 hPa, Schwartz et al, 2008)?

8. Page 8467, Lines 10-14, As well as the Manney et al paper cited, Manney et al (2008, ACP, 8, 505–522) also descirbe some details of the 2006 SSW. Manney et al

ACPD
8, S2808–S2810, 2008

(2008, JGR, in press) and Hoffmann et al 2007 should be cited in additional to Coy (particularly since it is not yet published) as detailing the timing of the SSW.

9. Page 8467, Lines 22-24, and page 8458, Lines 1-4, Should say something here about possible dependence on non-orographic GW drag parameterization. Also, although lower than in MLS and SABER data, is the position and evolution of the SSW in fact improved over (1) analyses with this NWP system that do not assimilate MLS and SABER, and (2) operational analyses such as ECMWF and GEOS-4/5?

10. Page 8468, Lines 6-29, this is a place where it would be helpful to know whether these features – in the middle stratosphere, where operational assimilation systems tend to do reasonably well even for this extreme event (e.g., Manney et al., 2008, JGR, in press) – are actually better represented in this analysis than in those that do not assimilate MLS and SABER data.

11. Page 8471, Lines 10-18, why are these shown only up to 70N latitude? Are the results very near the pole (highly relevant for SSW studies) similar?

12. Page 8472, Line 9, "warm" should be "high".

13. Page 8472, Line23-24, and Figure 9, why is the white line cut off just below 10hPa?

14. Page 8473, Lines 10-19, Isn't the lack of improvement in summer primarly just due to the symmetry and quiescence of the flow? (I think this is implied here, but you should say so explicitly.)

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 8455, 2008.